F.LE.A.4: Exponential Equations 3

1 If $ae^{bt} = c$, where a, b, and c are positive, then t equals

1) $\ln\left(\frac{c}{ab}\right)$

2) $\ln\left(\frac{cb}{a}\right)$

3) $\frac{\ln\left(\frac{c}{a}\right)}{b}$

4) $\frac{\ln\left(\frac{c}{a}\right)}{\ln b}$

2 The solution to the equation $5e^{x+2} = 7$ is

1) $-2 + \ln\left(\frac{7}{5}\right)$

2) $\left(\frac{\ln 7}{\ln 5}\right) - 2$

3) $\frac{-3}{5}$

4) $-2 + \ln(2)$

3 The solution to the equation $6\left(2^{x+4}\right) = 36$ is

1) -1

2) $\frac{\ln 36}{\ln 12} - 4$

3) $\ln(3) - 4$

4) $\frac{\ln 6}{\ln 2} - 4$

4 What is the solution to $8(2^{x+3}) = 48$?

1) $x = \frac{\ln 6}{\ln 2} - 3$

2) $x = 0$

3) $x = \frac{\ln 48}{\ln 16} - 3$

4) $x = \ln 4 - 3$

5 Which expression is *not* a solution to the equation $2^t = \sqrt{10}$?

1) $\frac{1}{2}\log_2 10$

2) $\log_2 \sqrt{10}$

3) $\log_4 10$

4) $\log_{10} 4$

6 The solution of $87e^{0.3x} = 5918$, to the *nearest thousandth*, is

1) 0.583
2) 1.945
3) 4.220
4) 14.066

7 To the *nearest tenth*, the solution to the equation $4300e^{0.07x} - 123 = 5000$ is

1) 1.1
2) 2.5
3) 6.3
4) 68.5

8 Using logarithms, find x, to the *nearest hundredth*: $2^x = 5$

9 Solve for x to the *nearest hundredth*. $2^x = 28$

10 Solve for x to the *nearest hundredth*: $2^x = \frac{3}{16}$

11 Using logarithms, solve the equation $2^{3x} = 7$ for x to the *nearest tenth*.

12 Solve $e^{4x} = 12$ algebraically for x, rounded to the *nearest hundredth*.

13 Solve algebraically for x to the *nearest thousandth*: $2e^{0.49x} = 15$

14 Solve $3.8e^{1.5t} = 16$ algebraically for t to the *nearest hundredth*.

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Answer Section

1 ANS: 3

$$e^{bt} = \frac{c}{a}$$

$$\ln e^{bt} = \ln \frac{c}{a}$$

$$bt \ln e = \ln \frac{c}{a}$$

$$t = \frac{\ln \frac{c}{a}}{b}$$

REF: 011813aii

2 ANS: 1

$$\ln e^{x+2} = \ln \frac{7}{5}$$

$$(x+2) \ln e = \ln \frac{7}{5}$$

$$x = -2 + \ln \frac{7}{5}$$

REF: 062207aii

3 ANS: 4

$$6\left(2^{x+4}\right) = 36$$

$$\ln 2^{x+4} = \ln 6$$

$$(x+4) \ln 2 = \ln 6$$

$$x + 4 = \frac{\ln 6}{\ln 2}$$

$$x = \frac{\ln 6}{\ln 2} - 4$$

REF: 082408aii

4 ANS: 1

$8(2^{x+3}) = 48$

$2^{x+3} = 6$

$(x+3)\ln 2 = \ln 6$

$x+3 = \dfrac{\ln 6}{\ln 2}$

$x = \dfrac{\ln 6}{\ln 2} - 3$

REF: 061702aii

5 ANS: 4

$\log 2^t = \log\sqrt{10}$ 2) $\dfrac{\log\sqrt{10}}{\log 2} = \log_2\sqrt{10}$, 1) $\log_2\sqrt{10} = \log_2 10^{\frac{1}{2}} = \dfrac{1}{2}\log_2 10$, 3) $\log_4 10 = \dfrac{\log_2 10}{\log_2 4} = \dfrac{1}{2}\log_2 10$

$t\log 2 = \log\sqrt{10}$

$t = \dfrac{\log\sqrt{10}}{\log 2}$

REF: 012009aii

6 ANS: 4

$\ln e^{0.3x} = \ln\dfrac{5918}{87}$

$x = \dfrac{\ln\dfrac{5918}{87}}{0.3}$

REF: 081801aii

7 ANS: 2

$4300e^{0.07x} = 5123$

$\ln e^{0.07x} = \ln\dfrac{5123}{4300}$

$0.07x = \ln\dfrac{5123}{4300}$

$x = \dfrac{\ln\dfrac{5123}{4300}}{0.07}$

$x \approx 2.5$

REF: 012302aii

8 ANS:

2.32

REF: 069542siii

9 ANS:
4.81

REF: 010141siii

10 ANS:
–2.42

REF: 089839siii

11 ANS:
0.9

REF: 068636siii

12 ANS:

$$\ln e^{4x} = \ln 12$$

$$4x = \ln 12$$

$$x = \frac{\ln 12}{4}$$

$$\approx 0.62$$

REF: 011530a2

13 ANS:

$$\ln e^{0.49x} = \ln 7.5$$

$$0.49x = \ln 7.5$$

$$x = \frac{\ln 7.5}{0.49} \approx 4.112$$

REF: 062330aii

14 ANS:

$$\ln e^{1.5t} = \ln \frac{16}{3.8}$$

$$1.5t = \ln \frac{16}{3.8}$$

$$t = \frac{\ln \frac{16}{3.8}}{1.5} \approx .96$$

REF: 062426aii